Regenerative and Cellular Sciences

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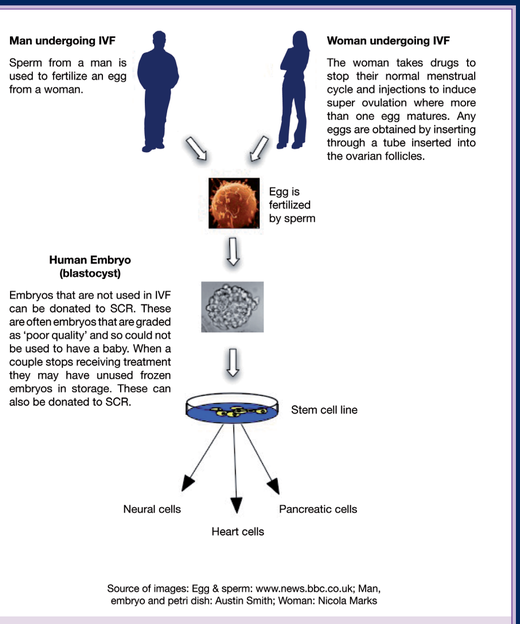
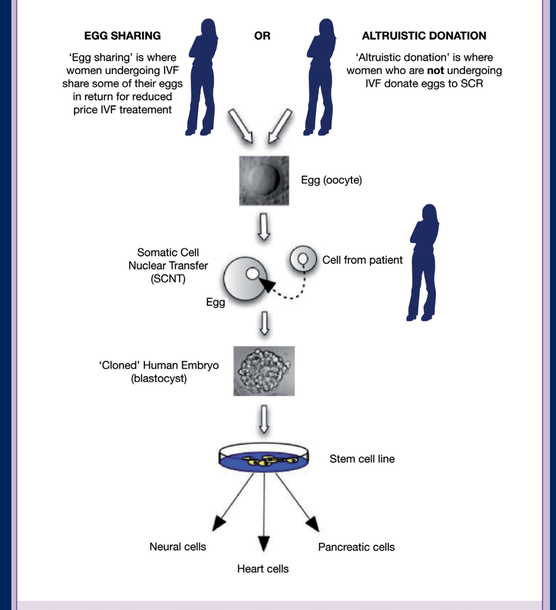
An Interactive Workshop

EMBRYONIC STEM CELLS: THE SCIENCE



Creating Stem Cell Lines From Leftover IVF Embryos

Creating Stem Cell Lines from Leftover IVF Embryos.
Source: Talking About Stem Cells



Creating Stem Cell Lines From Cloned Human Embryos

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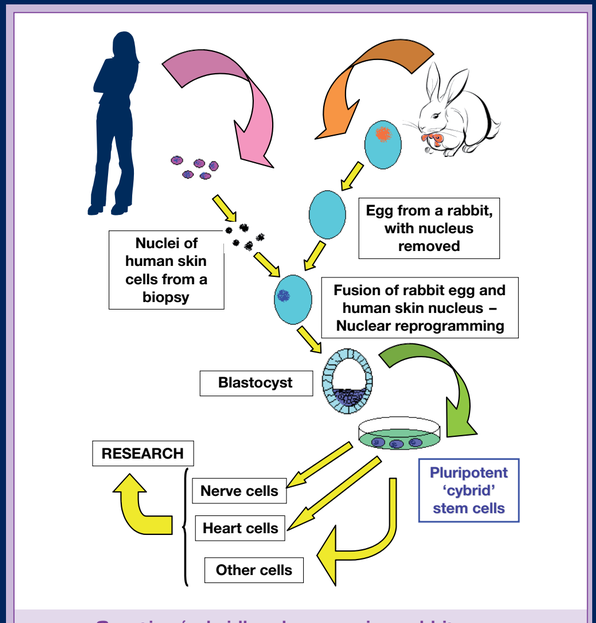
Source: Talking About Stem Cells



Creating 'cybrid' embryos, using rabbit eggs

Creating Cybrid Embryos.
Source: Talking About Stem Cells

WHAT ARE EMBRYONIC STEM CELLS?

Embryonic stem cells are taken from fertilised eggs that have reached the blastocyst stage, typically around 5 days post-fertilisation. Inside the ball of cells that makes up the blastocyst is the inner cell mass, a group of **pluripotent** embryonic stem cells (ie: cells that can become any type of specialised cell). Embryonic stem cells can be grown in Petri dishes in the laboratory by a process called cell culturing. If they are still growing in culture without differentiation after 6 months or more, they are characterised as embryonic stem cell lines, an important resource for scientists.

PROCESSES USING EMBRYOS

Obtaining Embryonic Stem Cells from Human Eggs - Women receive both a medicated nasal spray to stop their normal menstrual cycle and injections to induce super ovulation so that more than one egg matures. Under either local or general anaesthesia, eggs are removed through a tube inserted into the ovarian follicles. The long-term effects of this procedure are not well understood.

Obtaining Embryonic Stem Cells from Cloning - The highest quality eggs received from women are used to create embryos which are then subjected to somatic cell nuclear transfer so they can be reproduced and disease-specific cell lines can be generated for further study

Obtaining Embryonic Stem Cells from Cybrid Processes - Eggs from animals (rabbits because they already generate a lot of eggs and cows because their eggs would be a by-product of the food industry) are used to re-programme cells obtained from specific disease groups, thereby creating cytoplasmic hybrid embryos ('cybrids') which would contain human DNA in the nucleus and small amounts of animal DNA in the cytoplasm; some argue that they are 99+% human and would become more human with each cell division.

OTHER EMBRYO-BASED PROCESSES

Research in this area has led to questions about chimeras, transgenic humans and true hybrids.

Chimeras are created when animal cells are inserted into a human (embryo, foetus or person) or human cells are inserted into an animal (embryos, foetus or developed), and could be useful for testing cell lines in animals before putting them in humans.

Transgenic human embryos are created when animal genes are inserted into a human embryo in the early stages of development, and could be useful for 'humanising' animal organs for transplantation. Some mixes would be acceptable, but others not.

True animal-human hybrid embryos are created when animal sperm is mixed with a human egg or vice versa, though there are no known legitimate medical research purposes for doing so.

Spider-Goats for Cheaper Silk?
Source: S. Harmon

GOVERNANCE

In the UK, the HFEA regulates and oversees fertility treatment as well as licenses all research on embryos or necessarily using embryos.

In Argentina, ANMAT and INCUCAI have been involved in clinical trial review, but there is not yet systematic oversight of research activity.

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